

**DEPARTMENT OF ENVIRONMENTAL QUALITY
PERMITTING and COMPLIANCE DIVISION
MONTANA POLLUTANT DISCHARGE ELIMINATION SYSTEM
(MPDES)**

Fact Sheet

Permittee:	City of Glendive
Permit No.:	MT0021628
Receiving Water:	Glendive Creek
Facility Information:	
Name	City of Glendive Wastewater Treatment Lagoon
Location	120 Road 303
Facility Contact:	Jack Rice, Assistant Public Works Director 300 South Merrill Ave. Glendive, MT 59330 406-377-3318 Extension 15
Fee Information:	
Number of Outfalls	1
Outfall – Type	001-Major POTW

I. Permit Status

The previous permit was issued on February 25, 1999, became effective on April 1, 1999 and expired on October 31, 2003. An incomplete Environmental Protection Agency (EPA) 2A application was received on September 8, 2003. In a February 20, 2007 letter the Department requested that the facility provide a DEQ 1 application, update the EPA 2A application, and provide information requested in Part D, E and F of the 2A application. The updated application and other information were received on June 28, 2007.

II. Facility Information

A. Facility Description

The City of Glendive wastewater treatment facility (Glendive WWTF) consists of a three-cell facultative lagoon with aeration provided by two aeration transfer structures. The cells are 21.1, 24.1 and 25 acres in size. In 1986 the two aeration structures were reconstructed with concrete (including concrete baffles). These structures are located between cells 1 and 2 and 2 and 3 to increase aeration in the lagoon cells and to improve flow through the system. Raw wastewater enters cell 1 through the inlet box. There is an influent flow measuring device at the inlet manhole but because the influent pipe is a forced main there is no opening in the pipe from which to obtain influent samples. Effluent is discharged from cell 3 to Glendive Creek through a Parshall flume (see Figure 1). A 6500 gallon per minute (gpm) re-circulating pump was added in 1986 so the operator can pump back (recycle) wastewater from cell #3 to cell #1 to improve treatment (See Technical and Financial Assistance Bureau inspection report for April 26 and 27, 2006). The lagoon system can be operated in series or parallel flow modes. An April 26 and 27, 2006 inspection report noted sludge levels are not measured in the lagoon cells and recommended the city periodically measure the sludge depth in them.

Effluent is not disinfected before it is discharged to Glendive Creek. The design flow of the lagoon system is 1.9 million gallons per day (mgd) and is classified as a major discharger. A controlled discharge usually occurs in November and December and April and May each year for about 60 days. Table 1 summarizes the current design criteria for the facility.

Based on a May 23, 2001 inspection report, the facility maintains 118,211 feet of collection lines. Most of the collection system is approximately 90 years old. Five pump stations are maintained.

The facility is not operating under the EPA Pretreatment Program; however, the facility does accept wastewater from an industrial source [Burlington Northern Santa Fe Railroad (BNSF)].

BNSF discharges industrial wastewater from the BNSF maintenance facility to the Glendive WWTF from three sources: 1) diesel recovery system, 2) onsite wastewater

treatment plant and 3) oil/water separator (see below for more detail). BNSF has one or more pretreatment agreements with the City of Glendive to discharge wastewater to the Glendive WWTF. Industrial dischargers and other dischargers in the City of Glendive are regulated under pretreatment agreements and Chapter 2, Public and Private Sewers and Drains, of the local ordinance code.

On June 11, 2004 BNSF reported that the railroad's wastewater treatment plant was overwhelmed by a storm event which exceeded the capacity of the City of Glendive's collection system. This sanitary sewer overflow (SSO) event (and other SSO events in August 1999 and July 2000) occurs during storm events when the BNSF wastewater treatment plant is overloaded and combines with City municipal wastewater at a lift station and overflows the manhole at the ABC ball fields. On June 21, 2005 the Department sent the city a violation letter for the SSO. The letter requested the city find a permanent solution to prevent bypasses from the lift station to the storm sewer and Yellowstone River. The City responded in an October 24, 2005 letter requesting additional time to perform a preliminary engineering review to examine the entire collection system, including how BNSF's wastewater system connects to the City system.

On May 24 2006 the EPA performed an inspection of the Glendive WWTF. The City was cited in the inspection report stating it believes SSOs at the ABC ball fields are attributable to BNSF discharges and that the SSO events coincide with storm events that overload the BNSF wastewater system. EPA requested the City evaluate whether BNSF is a significant industrial user and re-evaluate the city's pretreatment agreement issued to BNSF. EPA also requested that the City establish discharge limits from the BNSF wastewater treatment plant and to also require monitoring for flow, hydrocarbons, pH and oil and grease. In a December 15, 2006 letter to EPA, the City stated that an additional evaluation of the BNSF and City systems is required to determine the significance of the combined discharge.

During a June 14, 2007 inspection of the Glendive WWTF by the Department the following observations were noted:

1. In June 2007 the facility failed an acute Whole Effluent Toxicity (WET) test using two species. The WET test was required as part of the application process. The initial ammonia concentration of 100% of the effluent was 13.9 mg/L during the test.
2. BNSF has one or more agreements with the City of Glendive to discharge industrial wastewater to the Glendive WWTF. Sources of BNSF wastewaters that are discharged to the City of Glendive's WWTF through the sanitary collection system include:
 - a. two wells from the BNSF diesel fuel recovery system that discharge directly to the Glendive collection system. No sampling or monitoring is required by the City.
 - b. the BNSF wastewater treatment plant. Two samples per month are required to be analyzed for pH, total suspended solids (TSS), nephelometric units (NTU) and oil and grease.

c. the oil/water separator near the old fueling platform. No flow monitoring or sampling is required for this source; the agreement with the City to discharge to the Glendive WWTF expired in 1993.

3. The discharge from the Glendive WWTF flows through a wetland area and creates a small channel that flows approximately 1000 feet to the north before it enters Glendive Creek. Glendive Creek is estimated to be approximately 25 feet wide at the point where the channel meets Glendive Creek.

4. The City has eliminated the sanitary sewer overflow (SSO) from the manhole to the ABC ball fields. This correction was required in a June 21, 2005 violation letter from the Department to the City. The manhole was sealed by tarring and bolting a manhole cover inside the manhole and placing another manhole on top of the first manhole. No further SSOs have been observed or documented since this manhole was sealed about two years ago.

5. Sludge in the first cell of the lagoon has mounded to the surface of the water at the influent pipe. Sludge has never been removed from the lagoon cells.

Table 1. Current Design Criteria Summary – City of Glendive

Facility Description:	
Three cell facultative lagoon with enhanced aeration and without disinfection.	
Construction Date: 1959	Modification Date: 1986, 1997
Design Year: unknown	(left blank)
Design Population: 19,450	Population Served: 4878
Design Flow Average (mgd): 1.9 mgd	Design Flow, Peak (mgd): unknown
Primary Cells: one	Secondary Cells: two
Minimum Detention Time (System) (days): 159	
Design BOD ₅ Removal (%): 90	Design Load (lb/day): 920
Design SS Removal (%): unknown	Design Load (lb/day): unknown
Collection System: separate	
SSO Events (Y/N): yes	Number: three
Bypass Events (Y/N): none	Number: none
Inflow Flow (mgd): unknown	Source:
Disinfection: none	Type:
Discharge Method: controlled twice/year (spring and fall)	
Effluent Flow Primary Device: Parshall flume	
Recording Device: totalizer	
Sludge Storage: none	
Sludge Disposal: none	EPA Biosolids Permit Authorization: none

B. Effluent Characteristics

Table 2 summarizes monthly self-monitoring effluent data reported by the Glendive WWTF during the period of record (POR) January 2000 through June 2006.

Table 2: Effluent Characteristics⁽¹⁾ for the Period January 2000 through June 2006.							
Parameter	Location	Units	Previous Permit Limit	Minimum Value	Maximum Value	Average Value	Number of Samples
Flow, Daily Average	Effluent	MGD	⁽⁶⁾	0.0994	3.04	1.56	30
Biochemical Oxygen Demand (BOD ₅)	Influent	MGD	⁽⁶⁾	--	--	--	--
	Effluent	mg/L	45/30 ⁽⁵⁾	8	124	22.6	30
	NA	% removal	85	--	--	--	--
	Effluent	lbs/day	475 ⁽⁸⁾	--	--	--	--
Total Suspended Solids (TSS)	Influent	mg/L	⁽⁶⁾	--	--	--	--
	Effluent	mg/L	135/100 ⁽⁵⁾	0	83	35.2	30
	NA	% removal	⁽⁷⁾	--	--	--	--
	Effluent	lbs/day	1580 ⁽⁸⁾	--	--	--	--
<i>E.coli</i> Bacteria ^{(2), (3)}	Effluent	cfu/100ml	⁽⁷⁾	--	--	--	--
pH	Effluent	s.u.	6.0-9.0	--	--	--	--
Temperature	Effluent	°C	⁽⁷⁾	--	--	--	--
Chlorine, Total Residual	Effluent	mg/L	⁽⁷⁾	--	--	--	--
Total Ammonia, as N, winter ⁽⁴⁾	Effluent	mg/L	⁽⁶⁾	5.8	13.1	9.3	8
Total Ammonia, as N, summer ⁽⁴⁾	Effluent	mg/L	⁽⁶⁾	2	19	10.7	21
Kjeldahl Nitrogen, as N	Effluent	mg/L	⁽⁶⁾	6.6	27.8	17.4	29
Nitrate + Nitrite, as N	Effluent	mg/L	⁽⁶⁾	0.05	1.2	0.25	28
Total Nitrogen	Effluent	mg/L	⁽⁶⁾	6.6	27.8	17.8	29
		lbs/day	545 ⁽⁸⁾	--	--	--	--
Total Phosphorus	Effluent	mg/L	⁽⁶⁾	3.7	5.5	4.4	29
		lbs/day	136 ⁽⁸⁾	--	--	--	--
Dissolved Oxygen	Effluent	mg/L	⁽⁷⁾	--	--	--	--
Oil and Grease	Effluent	mg/L	⁽⁷⁾	--	--	--	--
Total Dissolved Solids	Effluent	mg/L	⁽⁷⁾	--	--	--	--
Footnotes:							
(1) Conventional and nonconventional pollutants only, table does not include toxics.							
(2) Sample period is April 1 through October 31.							
(3) Geometric average							
(4) Winter period is November 1 through March 31; Summer period is April 1 through October 31.							
(5) Weekly average/Monthly average							
(6) No limit in previous permit; monitoring requirement only.							
(7) No monitoring or effluent limit in previous permit.							
(8) Nondegradation Annual Average Load Value, not a permit limit.							

Table 3 summarizes the intermittent discharge flow data for the period from January 2000 through May 2005.

Table 3: Summary of Discharge Flow Data in mgd from January 2000 through May 2005						
Month	2000	2001	2002	2003	2004	2005
	30-day Average	30-day Average	30-day Average	30-day Average	30-day Average	30-day Average
January	--	--	--	--	--	--
February	--	--	--	--	--	--
March	--	--	--	--	--	--
April	3.04	2.06	--	1.44	--	1.06
May	0.64	3.01	2.88	1.4	1.1	1.02
June	--	--	1.78	1.54	0.92	1.07
July	--	--	--	--	0.95	--
August	--	--	--	--	--	--
September	--	--	--	--	--	--
October	2.78	1.87	--	1.72	--	1.3
November	--	--	2.13	2.3	1.1	1.11
December	--	--	1.86	1.96	1.05	1.21
Maximum	3.04	3.01	2.88	2.3	1.1	1.3
Minimum	0.64	1.25	1.78	1.4	0.92	1.02

Dischargers greater than 1.0 mgd must provide WET testing results to the Department [ARM 17.30.1322(6)(i)(i)]. The facility failed an acute WET test on June 14, 2007. Based on the failed WET test and volume of wastewater discharged, quarterly WET testing will be required in this permit. The permit will also require the facility to determine the cause of the failed WET test [see Part IV.E.(4)].

The permittee received a violation letter on February 26, 2007 for exceeding the effluent BOD₅ limit. In March 2007 the permittee responded to the violation letter with documentation (laboratory reports) showing that a mistake was made reporting the BOD₅ number on the discharge monitoring report and that the BOD₅ effluent limit was not exceeded.

As part of the application process, the facility submitted analytical results from one sample of the effluent for total recoverable metals, volatile and semi-volatiles. Chromium, copper and zinc were detected at 0.001 mg/L, 0.031 mg/L and 0.01 mg/L, respectively. No volatile or semi-volatile compounds were detected. This is insufficient data to determine if water quality standards in Glendive Creek are exceeded for these parameters. Increased monitoring requirements in this permit will collect the necessary data to evaluate potential pollutants during the next permit cycle.

III. Technology-based Effluent Limits (TBELs)

The Montana Board of Environmental Review has adopted by reference 40 CFR 133 which define minimum treatment requirements for secondary treatment, or the equivalent, for publicly owned treatment works (POTW) (ARM 17.30.1209). Secondary treatment is defined in terms of effluent quality as measured by Biochemical Oxygen Demand (BOD₅), Total Suspended Solids (TSS), percent removal of BOD₅ and TSS, and pH.

These requirements may be modified on a case-by-case basis for facilities that are eligible for treatment equivalent to secondary (TES) treatment [40 CFR 133.101(g)] or alternative state requirements (ASR) for TSS. To determine if a facility is eligible for TES the facility must meet the requirements of 40 CFR 133.101(g), summarized as follows:

- 1) The BOD₅ and TSS effluent concentrations consistently achievable through proper operation and maintenance of the treatment works exceed the minimum effluent quality described for secondary treatment (40 CFR 133.102).
- 2) The treatment works utilize a trickling filter or waste stabilization pond, and
- 3) The treatment works utilizes biological treatment that consistently achieves a 30-day average of at least 65 percent removal (40 CFR 133.101(k)).

Water quality must not be adversely affected by the application of equivalent to secondary treatment. Effluent limits for BOD₅ cannot be relaxed unless the permittee has demonstrated that the relaxed limits will not result in a violation of water quality standards in the receiving water.

In addition to TES, permitting agencies may give special consideration to treatment works that employ waste stabilization ponds as the primary method for treating wastes. ASR may be incorporated into permits for lagoons if historic data for the system indicates that effluent limits based on TES cannot be achieved. The 30-day ASR for TSS in Montana is 100 mg/L [49 FR 37005; September 20, 1984]; the Department employed a 135 mg/L TSS for a 7-day limit based on best professional judgment. New facilities are not eligible for ASR.

The proposed TBELs satisfying the requirements of ARM 17.30.1209 are given in Table 4. These limits are based on:

1. The effluent limits for BOD₅ in the previous permit were a 7-day average of 45 mg/L and a 30-day average of 30 mg/L. These limits will remain in the renewed permit because data shows that the facility can consistently achieve these limits through proper operation and maintenance. (For the POR, the average BOD₅ concentration is 23 mg/L and the 95th percentile is 30 mg/L).

2. The effluent limits for TSS in the previous permit are 135 mg/L for a weekly average and 100 mg/L for a monthly average. These ASR limits are reduced in this permit to a 7-day average of 65 mg/L and a 30-day average of 45 mg/L because data shows that the facility can consistently achieve these limits through proper operation and maintenance (For the POR, the average TSS concentration is 35 mg/L and the 95th percentile is 64 mg/L).

ARM 17.30.1345 [40 CFR 122.45(f)(1)] requires that effluent limits must be expressed in terms of mass (mass/time), except for certain parameters, such as pH or temperature. For municipal treatment plants, mass-based limits are based on design flow (discussed in Part II) for the facility.

Mass based limits are calculated as follows:

Load (lbs/day) = Design Flow (mgd) x Concentration (mg/L) x Conversion Factor (8.34)

BOD:

30-d Load = 1.9 MGD x 30 mg/L x 8.34 = 475 lbs/day

7-d Load = 1.9 MGD x 45 mg/L x 8.34 = 713 lbs/day

TSS:

30-d Load = 1.9 MGD x 45 mg/L x 8.34 = 713 lbs/day

7-d Load = 1.9 MGD x 65 mg/L x 8.34 = 1030 lbs/day

Proposed mass-based TBELs for BOD₅ and TSS are listed in Table 4.

Table 4. Technology-based Effluent Limits				
Parameter	Units	Average Monthly Limit ¹	Average Weekly Limit ¹	Rationale
BOD ₅	mg/L	30	45	40 CFR 133.105(a)
	lbs/day	475	713	
	% removal	85 ²	--	
TSS	mg/L	45	65	40 CFR 133.105(b)
	lbs/day	713	1030	
	% removal	65 ³	--	
pH	s.u.	6.0-9.0 (instantaneous)		40 CFR 133.105 (c)
1. See Definitions section at end of permit for explanation of terms. 2. The arithmetic mean of the values for BOD ₅ for effluent samples collected in a period of 30 consecutive days shall not exceed 15% of the arithmetic mean of the values for influent samples collected at approximately the same time during the same period (85% removal). 3. The arithmetic mean of the values for TSS for effluent samples collected in a period of 30 consecutive days shall not exceed 35% of the arithmetic mean of the values for influent samples collected at approximately the same time during the same period (65% removal).				

Nondegradation

The provisions of ARM 17.30.701, *et seq.* (Nondegradation of Water Quality) apply to new or increased sources of pollution [ARM 17.30.702(18)]. Sources that are in compliance with the conditions of their permit and do not exceed the limits established in the permit, or as determined from a permit previously issued by the Department, are not considered new or increased sources. In the previous Statement of Basis (SOB), the Department calculated mass-based load values for BOD₅, TSS, total nitrogen and total phosphorus [Nondegradation Threshold Values, August 6, 1998]. Any increase above this amount is subject to the provisions of the Nondegradation Policy (75-5-303, MCA). The permittee was not required to report load data for these parameters during the POR so a comparison of the nondegradation load to the actual load can not be made. The discharge does not constitute a new or increased source for the purposes of Montana Nondegradation requirements.

Table 5. Nondegradation Loads

Parameter	Allocated Load (lbs/day)
BOD ₅	475
TSS	1580
Nitrogen	545
Phosphorus	136

IV. Water Quality-based Effluent Limits

A. Scope and Authority

Permits are required to include water quality-based effluent limits (WQBEL) when technology based effluent limits are not adequate to protect state water quality standards (40 CFR 122.44 and ARM 17.30.1344). ARM 17.30.637(2) states that no wastes may be discharged that can reasonably be expected to violate any state water quality standards. Montana water quality standards (ARM 17.30.601 *et seq.*) define both water use classifications for all state waters and numeric and narrative standards that protect those designated uses. New sources, as defined in ARM 17.30.703(16), are subject to Montana Nondegradation Policy (75-5-303, MCA) and regulations (ARM 17.30.701, *et. seq.*).

B. Receiving Water

Wastewater is discharged from the facility to Glendive Creek, which is a tributary to the Yellowstone River. The receiving water is classified as C-3 according to Montana Water Use Classifications [ARM 17.30.611(1)(c)]. Waters classified C-3 are to be maintained suitable for bathing, swimming and recreation, and growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl and furbearers. The quality of these waters is naturally marginal for drinking, culinary and food processing purposes, agriculture and industrial water supply. Degradation which will impact established beneficial uses will not be allowed.

The C-3 classification for the receiving water is a change from the previous Statement of Basis (SOB) which stated "the Yellowstone River and Glendive Creek in the area of the discharge are classified B-3 waters". The following rational was provided in the previous SOB for classifying the receiving water as B-3: "effluent enters Glendive Creek about 3,000 feet from the confluence with the Yellowstone River main channel in an area flooded by the Yellowstone River during high water. Water from the Yellowstone River backs up into the channel of Glendive Creek and extends upstream of the discharge point. For the purpose of water quality-based limits and waste load allocations we will accept the Yellowstone River as the receiving state water". There is no documentation provided for this rational in the previous SOB and the interpretation of ARM 17.30. 611 is inaccurate (the Yellowstone River mainstem is classified as B-3; the Yellowstone River drainage is classified as C-3). Furthermore, if the confluence area of Glendive Creek and the Yellowstone River flooded, it would do so only for a limited time period during the spring - not the entire year.

Consequently, Glendive Creek is the actual receiving water. The discharge actually flows in a small channel through cattails for about 1000 feet to the north before it enters Glendive Creek (the main channel of the Yellowstone River is located about 2000 feet north of this location). Glendive Creek in the vicinity of the discharge is considered high quality water pursuant to Montana's Nondegradation Policy and degradation of high quality water is not allowed unless authorized by the Department under 75-5-303(3), MCA. However, because the discharge has not exceeded the nondegradation threshold described in Section III, the source is not subject to the nondegradation requirements at this time.

Glendive Creek is located within the Lower Yellowstone watershed as identified on United States Geological Service (USGS) Hydrological Unit Code (HUC) 10100004 and Montana Stream Segment MT42M002_130. Glendive Creek in the vicinity of the discharge is listed

on the 1996 303(d) list as not supporting these uses: agriculture, aquatic life support, drinking water supply and warm water fishery. The probable causes of impairment are: flow alteration, other organics, salinity/TDS/chlorides and suspended solids. The probable sources of impairment are: agriculture, irrigated crop production and natural sources. Glendive Creek in the vicinity of the discharge is listed on the 2006 303(d) list as not supporting these uses: aquatic life and warm water fishery. The probable causes of impairment are: alteration in stream-side or littoral vegetative covers, cadmium, chromium (total), copper, iron, lead, nickel, selenium, solids (suspended/bed load) and zinc. The probable sources of impairment are: grazing in riparian or shoreline zones, natural sources and sources unknown.

The USGS maintained a monitoring station (USGS 06327850) on Glendive Creek from 1977 until 1981. The location of this station was about one mile upstream from the Glendive WWTF at the frontage road bridge east of Glendive. The average flow at this station from 1977 through 1981 was 13.8 cubic feet per second (cfs). To calculate a 7Q10 for use in this permit, as allowed in ARM 17.30.635(4) and discussed below, data representing spring runoff or extreme precipitation events were removed from the data set and the "low flows" were averaged. The resulting 7Q10 used to calculate effluent limits in this permit is 1.88 cfs or 1.22 mgd. The dilution ratio is 0.42 (1.22 mgd/2.94 mgd).

C. Applicable Water Quality Standards

Discharges to surface waters classified C-3 are subject to the specific water quality standards of ARM 17.30.629 (March 31, 2006), Department Circular DEQ-7 (February 2006), as well as the general provision of ARM 17.30.635 through 637. In addition to these standards, dischargers are also subject to ARM 17.30 Subchapter 5 (Mixing Zones, November 2004) and Subchapter 7 (Nondegradation of Water Quality, June 30, 2004).

ARM 17.30.635(4) requires that the design condition for disposal systems must be based on the 7-day average flow of the receiving water which is expected to occur on average once in 10-years (7Q10). More restrictive requirements may be necessary due to specific mixing zone requirements.

D. Mixing Zone

A mixing zone is an area where the effluent mixes with the receiving water and certain water quality standards may be exceeded [ARM 17.30.502(6)]. The Department must determine the applicability of currently granted mixing zones [ARM 17.30.505(1)]. Mixing zones allowed under a permit issued prior to April 29, 1993 will remain in effect unless there is evidence that previously allowed mixing zones will impair existing or anticipated uses [ARM 17.30.505(1)(c)].

In accordance with ARM 17.30.517(1)(b), acute water quality standards for aquatic life may not be exceeded in any portion of the mixing zone unless the Department finds that allowing minimal initial dilution will not threaten or impair existing uses. The discharge must also comply with the general prohibitions of ARM 17.30.637(1) which require that state waters, including mixing zones, must be free from substances which will:

- (a) settle to form objectionable sludge deposits or emulsions beneath the surface of the water or upon adjoining shorelines;
- (b) create floating debris, scum, a visible oil film (or be present in concentrations at or in excess of 10 milligrams per liter) or globules of grease or other floating materials;
- (c) produce odors, colors or other conditions as to which create a nuisance or render undesirable tastes to fish flesh or make fish inedible;
- (d) create concentrations or combinations of materials which are toxic or harmful to human, animal, plant or aquatic life; and
- (e) create conditions which produce undesirable aquatic life.

Although certain standards may be exceeded in the mixing zone, an effluent in its mixing zone may not block passage of aquatic organisms nor may it cause acutely toxic conditions [ARM 17.30.602(16)]. No mixing zone will be granted that will impair beneficial uses [ARM 17.30.506(1)]. Acute standards may not be exceeded in any part of the mixing zone [ARM 17.30.507(1)(b)]. Aquatic life chronic, aquatic life acute and human health standards may not be exceeded outside of the mixing zone [ARM 17.30.507(1)(a)].

A standard mixing zone may be granted for facilities which discharge less than 1 million gallons per day (MGD) or when mixing is nearly instantaneous [ARM 17.30.516(d)]. Nearly instantaneous mixing is assumed if the discharge is through an effluent diffuser, when the mean daily flow exceeds the 7-day, 10-year low flow (dilution ratio <1) or the permittee demonstrates through a Department approved study plan that the discharge is nearly instantaneous. A nearly instantaneous mixing zone may not extend downstream more than two (2) river widths. Effluent discharges which do not qualify for a standard mixing zone must apply for a source specific mixing zone in accordance with ARM 17.30.518 and must conform to the requirements of 75-5-301(4), MCA which states that mixing zones must be the smallest practicable size; have minimal effects on uses; and, have definable boundaries. ARM 17.30.515(2) states that a person applying for a mixing zone must indicate the type of mixing zone and provide sufficient detail for the Department to make a determination regarding the authorization of the mixing zone under the rules of Subchapter 5.

Best Professional Judgment was used to define the mixing zone in the previous permit because there were no available field data. The mixing zone was defined as a segment of Glendive Creek extending from the discharge point downstream 3,000 feet to the confluence with the main stem of the Yellowstone River and then two miles downstream (in the Yellowstone River) to a point in the NE $\frac{1}{4}$ of Section 8, Township 16N, Range 56 East. There is no basis in the previous SOB for this mixing zone and as discussed in Part IV.B, the receiving water is Glendive Creek not the Yellowstone River. Therefore, the mixing zone in the previous permit is inappropriate for this discharge because effluent mixes rapidly with the receiving water (Glendive Creek)(dilution ratio is <1). Further dilution with downstream waters (Yellowstone River) is not appropriate or authorized by rule or statute which state that a mixing zone must be the smallest practicable size [75-5-301(4), MCA].

No water quality-based effluent limits that use a mixing zone are included in this permit so no mixing zone will be defined in this permit. Ammonia limits are calculated based on allowing limited mixing with Glendive Creek (25%) but these limits will not be included in this permit because the facility cannot achieve them at this time (see Part IV.E. 3).

E. Basis for WQBEL (Reasonable Potential and Calculations)

Pollutants typically present in municipal wastewater that may cause or contribute to a violation of water quality standards include conventional pollutants such as biological material (measured by BOD₅), suspended solids, oil & grease, *Escherichia coli* (*E. coli*) bacteria and pH; nonconventional pollutants such as chlorine, ammonia, nitrogen and phosphorus; and toxics such as metals and organics.

Effluent limits are required for all pollutants which demonstrate a reasonable potential to exceed numeric or narrative standards. The Department uses a mass balance equation to determine reasonable potential based on *EPA Technical Support Document for Water Quality based Toxics Control (TSD)* (EPA/505/2-90-001). Input parameters are based on receiving water concentration; maximum projected effluent concentration and design flow of the wastewater treatment facility, and the applicable receiving water flow. Due to the lack of adequate effluent characterization for potentially harmful or toxic constituents (metals and organics), the Department is unable to determine what effluent limits are necessary for these parameters at this time. The Department is proposing effluent limits for certain conventional pollutants for which adequate data exists.

1. Conventional Pollutants

The facility provides a significant reduction in biological material and solids through secondary treatment (Section III). No additional WQBEL will be required for these parameters (BOD₅, TSS and pH).

Oil and Grease - There was no effluent limit or monitoring requirements for oil and grease in the previous permit. Because the BNSF facility may discharge oil and grease to the city sewer system, the oil and grease instantaneous maximum limit in this renewal permit is 10 mg/L, effective immediately [ARM 17.30. 637(1) (b)]. Monthly monitoring for oil and grease will be required, effective immediately.

***Escherichia coli* (*E. coli*) Bacteria** - There were no effluent limits for pathogens in the previous permit. This renewed permit identifies pathogen limits to protect public health. Montana water quality standards were revised to replace fecal coliform bacteria with *E. coli* to reflect the latest federal guidance. The applicable standards for *E. coli* bacteria are:

April 1 through October 31 of each year - the geometric mean number of *E. coli* must not exceed 126 colony forming units (cfu) per 100 milliliters (ml) and 10% of the total samples may not exceed 252 cfu per 100 ml during any 30-day period [ARM 17.30.625(2)(a)(i)]; and

November 1 through March 31 of each year - the geometric mean number of *E. coli* must not exceed 630 cfu per 100 ml and 10% of the total samples may not exceed 1,260 cfu per 100 ml during any 30-day period [ARM 17.30.625(2)(a)(ii)].

ARM 17.30.637(1)(d) requires that state waters, including mixing zones, be free from substances which create concentrations or combinations of materials which are toxic or harmful to humans. These effluent limits apply at the end of the discharge pipe. Since there is no pathogen effluent data available it is unknown whether the facility can meet the proposed *E. coli* limits.

E. coli limits calculated in this Fact Sheet will not be included in this permit because the Glendive WWTF will need to evaluate significant upgrades to comply with ammonia limits during the next permit cycle (see below) so it is reasonable to allow the facility time to plan, design, finance and construct a facility considering all new permits limits simultaneously. The proposed *E. coli* limits will remain in this Fact Sheet and provide a basis for *E. coli* limits during the next permit cycle.

2. Non-conventional Pollutants

Total Residual Chlorine (TRC) - The facility does not currently disinfect the effluent and there is no TRC limit in effect. The facility may need to install disinfection to meet pathogen limits. In the event chlorination is used as a means of disinfection, the chlorine effluent limits in this permit will be an average monthly limit of 0.011 mg/L (chronic) and 0.019 mg/L (acute) for a daily maximum limit. These limits apply at the end of the discharge pipe [ARM 17.30.637(1)(d)]. Analytical methods in 40 CFR Part 136 requires chlorine samples to be analyzed immediately. On-site sampling for TRC with a chlorine meter using an approved method is required. The method must achieve a minimum detection level of 0.1 mg/L. Sampling of effluent with analytical results less than 0.1 mg/l is considered in compliance with the chlorine limit. TRC limits do not apply if ultra-violet (UV) light is utilized for disinfection.

TRC limits calculated in this Fact Sheet will not be included in this permit because the Glendive WWTF will need to evaluate significant upgrades to comply with ammonia limits during the next permit cycle (see below) so it is reasonable to allow the facility time to plan, design, finance and construct a facility considering all new permits limits simultaneously. The proposed TRC limits will remain in this Fact Sheet and provide a basis for TRC limits during the next permit cycle.

Total Ammonia-N: - Total Ammonia-N limits are developed based on standards that account for a combination of pH and temperature of the receiving stream, the presence or absence of salmonid species, and the presence or absence of fish in early life stages. Glendive Creek is a warm water fishery without salmonids present. Table 6 summarizes the total ammonia-N water quality standards for Glendive Creek using the USGS ambient water quality data for Glendive Creek.

Table 6. Total Ammonia-N Water Quality Standards for Receiving Water.

Condition	Period ⁽¹⁾	Salmonids Present	Early Life Stages Present	Ambient Condition		Water Quality Standard ⁽²⁾
				pH	Temperature °C	
Acute	Annual	No	NA	9.1 ⁽³⁾	NA	1.3
Chronic	Summer	NA	Yes	9.0 ⁽⁴⁾	23.5 ⁽⁴⁾	0.28
Chronic	Winter	NA	Yes	8.7 ⁽⁴⁾	4 ⁽⁴⁾	0.78
Footnotes: NA – Not Applicable						
(1) Winter period is taken to be November 1 through March 31; summer period is taken to be April 1 through October 31.						
(2) Acute - maximum daily; Chronic - 30-day average concentration.						
(3) Based on 95 th percentile of annual data.						
(4) Based on 75 th percentile of values in the applicable period.						

Reasonable potential (RP) to exceed the chronic and acute water quality standards for total ammonia-N in Table 6 were assessed using *Equation 1*, where:

C_{RP} = receiving water concentration (RWC) after mixing, mg/L
 C_E = maximum observed effluent concentration, 19 mg/L
 C_S = RWC upstream of discharge, 0.1 mg/L
 Q_S = applicable receiving water flow, 1.88 (25% chronic) = 0.47 cfs
 Q_E = applicable facility design flow rate, 2.94 cfs

$$C_{RP} = \frac{(2.94 \times 19) + (0.47 \times 0.1)}{(2.94 + 0.47)} = 40.5 \text{ mg/L}$$

The resulting RP value is greater than the chronic and acute ammonia standards in Table 6 so RP exists for ammonia and ammonia limits are necessary. There are no ammonia limits in the previous permit. The proposed ammonia limits are calculated in Appendix I using the EPA Technical Support Document approach. The average monthly ammonia limit is 0.3 mg/L; the maximum daily ammonia limit is 0.4 mg/L.

Ammonia limits calculated in this Fact Sheet will not be included in this permit because the Glendive WWTF is not capable of removing ammonia to these levels and the process for upgrading the facility is outside the scope of this five (5) year permit cycle. The permit will include a compliance schedule requiring the City to evaluate upgrades, including but not limited to, land application, piping to the Yellowstone River and increased aeration or other treatment, to achieve compliance with the proposed ammonia limits. The proposed ammonia effluent limits will remain in this Fact Sheet and provide a basis for ammonia limits during the next permit cycle.

3. Toxic Pollutants

Metals and organic compounds - There is insufficient metals and organics effluent data available at this time to determine if water quality standards in Glendive Creek are exceeded for these parameters. Increased monitoring requirements in this permit will collect the necessary data to evaluate these potential pollutants during the next permit cycle.

4. Whole Effluent Toxicity (WET) -

Whole Effluent Toxicity - ARM 17.30.637(1)(d) requires that state surface waters be "free from" substances attributable to municipal, industrial or agricultural discharges that will create concentrations or combinations of materials which are toxic or harmful to human, animal, plant or aquatic life. Federal rule requires that permits include enforceable permit limits for whole effluent toxicity when the discharge causes, or has the reasonable potential to cause toxicity in the receiving water (40 CFR 122.44). The Department implements the general prohibition of 637(1)(d) with the use of whole effluent toxicity testing (40 CFR 136). Implementation guidelines and the Department's toxic control strategy for whole effluent toxics control are given in Region VIII NPDES Whole Effluent Toxics Control Program (EPA, August 1997, page 8). Limited toxicity may be authorized within a Department authorized mixing zone [see Part III.C (Mixing Zone) of this FS for additional discussion].

The Department finds that there is reasonable potential for the discharge to cause toxicity in the receiving water based on the following factors: 1) major facility with industrial user(s); 2) low dilution ratio (less than 1) in the receiving water; 3) WET failure, based on June 5, 2007 test; 4) inadequate characterization of effluent (insufficient data on metals, VOC, and other potential toxicants); and 5) intermittent nature of discharge. Therefore, Part I of the permit will contain an effluent limit prohibiting acute toxicity in the effluent.

The permittee will be required to conduct quarterly composite WET testing starting with the first quarter of calendar year 2010. The Department is delaying monitoring to this date (2010) to allow the permittee to prepare sampling and QA/QC protocols. Two species quarterly monitoring will be required; testing may be reduced, with Department approval, to one (alternating) species quarterly monitoring after 12 consecutive months of no toxicity (standard condition). The permittee will be required to conduct Toxicity Reduction Evaluation (TRE) / Toxicity Identification Evaluation (TIE) should persistent toxicity be identified in the effluent (standard condition). WET sampling and analysis is required in any calendar quarter in which a discharge from the facility occurs, regardless of the duration of this discharge. Standard WET testing language will be included in the permit.

IV. Final Effluent Limits

Effluent Limitations					
Parameter	Units	Effluent Limitations			
		Average Monthly Limit ¹	Average Weekly Limit ¹	Maximum Daily Limit ¹	Instantaneous Maximum Limit ¹
Biochemical Oxygen Demand (BOD ₅)	mg/L	30	45	--	--
	lbs/day	475	713	--	--
BOD ₅ Removal ²	%	85	85	--	--
Total Suspended Solids (TSS)	mg/L	45	65	--	--
	lbs/day	713	1030	--	--
TSS Removal ²	%	65	65	--	--
Oil and grease	mg/L	--	--	--	10
Footnotes:					
1. See definition in permit.					
2. Applicable beginning June 1, 2008 after the access port to influent line is installed.					

pH: Effluent pH from Outfall 001 shall remain between 6.0 and 9.0 standard units (instantaneous minimum and instantaneous maximum) unless a variation is due to natural biological processes. For compliance purposes, any single analysis or measurement beyond this limitation shall be considered a violation of the conditions of this permit.

Acute Toxicity: There shall be no acute toxicity in the effluent from Outfall 001. Acute toxicity occurs when 50 percent or more mortality is observed for a test species at any effluent concentration. Acute toxicity tests shall be conducted in accordance with the requirements in Part I. C. of the permit.

V. Monitoring Requirements

A. Influent/Effluent Monitoring

Monitoring Requirements				
Parameter	Unit	Sample Location	Sample Frequency	Sample Type ¹
Flow	mgd	Effluent	Continuous	Instantaneous ⁵
5-Day Biological Oxygen Demand (BOD ₅)	mg/L	Influent ⁶	1/Week	Grab
	mg/L	Effluent	3/Week	Grab
	% Removal ⁴	Effluent	1/Month	Calculated
	lbs/day	Effluent	1/Month	Grab
Total Suspended Solids (TSS)	mg/L	Influent ⁶	1/Week	Grab
	mg/L	Effluent	3/Week	Grab
	% Removal ⁴	Effluent	1/Month	Calculated
	lbs/day	Effluent	1/Month	Calculated
pH	s.u.	Effluent	1/Week	Instantaneous
Temperature	°C	Effluent	1/Week	Instantaneous
<i>E. coli</i> Bacteria	cfu/100ml	Effluent	1/Week	Grab
Total Residual Chlorine ²	mg/L	Effluent	Daily	Grab
Oil and Grease	mg/L	Effluent	Monthly	Grab
Total Ammonia	mg/L	Effluent	1/Week	Grab
Nitrate + Nitrite, as N	mg/L	Effluent	1/Month	Grab
Kjeldahl Nitrogen, Total, as N	mg/L	Effluent	1/Month	Grab
Total Nitrogen, as N ³	mg/L	Effluent	1/Month	Calculated
	lbs/day	Effluent	1/Month	Calculated
Total Phosphorus, as P	mg/L	Effluent	1/Month	Grab
	lbs/day	Effluent	1/Month	Calculated
Whole Effluent Toxicity, Acute	% Effluent	Effluent	Quarterly	Composite
Footnotes: 1. See Definition section at end of permit for explanation of terms. 2. The Permittee is only required to sample for total residual chlorine if chlorine is used as a disinfectant in the treatment process. If chlorine is <i>not</i> used, write "NA" on the DMR for this parameter. 3. Calculated as the sum of Nitrate + Nitrite as N, and Total Kjeldahl Nitrogen concentration. 4. Percent (%) Removal shall be calculated using the monthly average values. 5. Requires recording device or totalizer 6. Beginning June 1, 2008 after the influent access port is installed.				

Monitoring Requirements (Continued)				
Parameter	Unit	Sample Frequency	Sample Type ¹	ML
Antimony, Total Recoverable ²	µg/L	Semiannual ³	Composite	1
Arsenic, Total Recoverable ²	µg/L	Semiannual ³	Composite	1
Beryllium, Total Recoverable ²	µg/L	Semiannual ³	Composite	1
Cadmium, Total Recoverable ²	µg/L	Semiannual ³	Composite	0.1
Chromium, Total Recoverable ²	µg/L	Semiannual ³	Composite	10
Copper, Total Recoverable ²	µg/L	Semiannual ³	Composite	1
Lead, Total Recoverable ²	µg/L	Semiannual ³	Composite	1
Mercury, Total Recoverable ²	µg/L	Semiannual ³	Composite	0.1
Nickel, Total Recoverable ²	µg/L	Semiannual ³	Composite	10
Selenium, Total Recoverable ²	µg/L	Semiannual ³	Composite	1
Silver, Total Recoverable ²	µg/L	Semiannual ³	Composite	1
Thallium, Total Recoverable ²	µg/L	Semiannual ³	Composite	1
Zinc, Total Recoverable ²	µg/L	Semiannual ³	Composite	10
Cyanide, Total	µg/L	Semiannual ³	Grab	5
Phenols, Total	µg/L	Semiannual ³	Grab	10
Hardness, Total (as CaCO ₃)	mg/L	Semiannual ³	Grab	10
Volatile Organic Pollutants ⁴	µg/L	Semiannual ^{3,5}	Composite	6
Semi-Volatile, Acid Compounds ⁷	µg/L	Semiannual ^{3,5}	Composite	6
Semi-Volatile, Base Neutral ⁷	µg/L	Semiannual ^{3,5}	Composite	6
Footnotes: 1. See Definition section at end of permit for explanation of terms. 2. Metals shall be analyzed as total recoverable, use EPA Method (Section) 4.1.4 [EPA 600/4-79-020, March 1983] or equivalent. 3. Samples must be collected beginning in calendar year 2010. 4. 40 CFR 122, Appendix J, Table 2, use EPA Method 1624 Revision B, or equivalent. 5. Sampling required only in third and fifth calendar years after the effective date of the permit. This information will not be entered on the DMR form; a copy of the analytical laboratory report must be attached to the DMR for the applicable reporting period. 6. See approved method for minimum level (ML). 7. 40 CFR 122, Appendix J, Table 2, use EPA Method 1625 Revision B, or equivalent.				

B. Sludge Requirements

The facility is not authorized to dispose of sludge under the EPA Region VIII General Biosolids permit. This permit will contain standard conditions requiring authorization under the EPA General Biosolids permit for any removal of biosolids from the lagoon system.

C. Pretreatment Program

The facility is not currently operating under the EPA Pretreatment Program. The permit will include standard language restricting introducing certain pollutants to the Glendive WWTF and requiring the facility to provide adequate notice to the Department for a new source, volume or character of industrial pollutants introduced to the system.

VI. Nonsignificance Determination

The nondegradation loads calculated in the previous permit will remain in the renewal permit so the discharge from the Glendive WWTF does not constitute a new or increased source of pollutants pursuant to ARM 17.30.702(18) and a nonsignificance analysis is not required [ARM 17.30.705(1)].

VII. Special conditions/Compliance Schedule

A. Influent Measurements

Currently, the facility lacks an adequate location to measure influent BOD₅ and TSS concentrations at the forced main pipe in the manhole at the lagoon. To comply with the National Secondary Treatment Standards for percent removal for BOD₅ and TSS, an access in the influent pipe to collect influent samples must be installed by June 1, 2008.

Authority: ARM 17.30.1342(10)(a) and 75-5-602(3), MCA:

This rule and statute requires that samples taken for the purpose of monitoring must be representative of the monitored activity and the owner or operator of a facility must install, use and maintain monitoring equipment to effectively monitor the discharge.

B. Ammonia, *E.coli* and TRC Effluent Limitations

The facility can not achieve the calculated ammonia limits in this Fact Sheet so these limits will not be included in this permit. The facility must evaluate technologies and options to achieve ammonia limits during this permit cycle, including but not limited to, land application, piping the discharge to the Yellowstone River and increased aeration.

With submittal of the permit renewal application in five years or sooner, the permittee is required to submit plans and schedules by June 1, 2012 for planning, design, funding, and construction of upgrades required to meet the proposed limits.

Authority: ARM 17.30.1345(1) and 75-5-402(3), MCA:

This rule and statute requires that effluent limitations must be established for each outfall and that limitations be clearly specified in the permit. Ammonia limits calculated in this Fact Sheet will not be included in this permit because the Glendive WWTF is not capable of removing ammonia to these levels and the process for upgrading the facility is outside the scope of this five (5) year permit cycle. The proposed ammonia effluent limits will remain in this Fact Sheet and provide a basis for ammonia limits during the next permit cycle. In addition, it is reasonable to postpone TRC and *E.coli* limits to allow the facility time to plan, design, finance and construct a facility while considering all new permits limits (except oil and grease) simultaneously.

C. Sludge

The permittee must remove accumulated sludge in the first lagoon cell and monitor and remove sludge in the remaining cells, if necessary. The permittee must submit a plan and schedule to remove sludge by December 31, 2009.

Authority: ARM 17.30.1342(5) and 75-5-605(1)(b), MCA:

This rule and statute require that facilities properly operate and maintain the facility and failure to do so is a violation of the permit.

D. Schedule for Special Conditions

Compliance Schedule for Special Conditions	
Milestone	Due Date
Provide an access port in the influent pipe to collect BOD ₅ and TSS influent samples.	June 1, 2008
Remove accumulated sludge in the first lagoon cell and monitor and remove sludge in the remaining cells, if necessary.	December 31, 2009
Provide annual progress reports, beginning December 31, 2010, to the Department explaining progress made in evaluating technologies and options to achieve ammonia, TRC and <i>E.coli</i> limits.	December 31, 2010
Complete evaluation of technologies and options to achieve ammonia, <i>E. coli</i> , and TRC limits and submit final engineering report detailing how and when these limits will be achieved during the next permit cycle.	June 1, 2012

VIII. Other Information

On September 21, 2000, a U.S. District Judge issued an order stating that until all necessary total maximum daily loads (TMDLs) under Section 303(d) of the Clean Water Act are established for a particular water quality limited segment (WQLS), the State is not to issue any new permits or increases under the MPDES program. The order was issued in the lawsuit Friends of the Wild Swan v. U.S. EPA, et al. (CV 97-35-M-DWM), District of Montana and Missoula Division.

The Department finds that renewal of this permit does not conflict with Judge Molloy's Order (CV 97-35-M-DVM) because it is not a new permit and the permit does not authorize an increase load or discharge of pollutants.

IX. Information Sources

40 CFR, Parts 122, 136, July 1, 2000.

ARM Title 17, Chapter 30, Subchapter 5 - Mixing Zones in Surface and Ground Water.

ARM Title 17, Chapter 30, Subchapter 6 - Surface Water Quality Standards.

ARM Title 17, Chapter 30, Subchapter 7 - Nondegradation of Water Quality.

ARM Title 17, Chapter 30, Subchapter 13 - Montana Pollutant Discharge Elimination System (MPDES) Standards.

DEQ. Circular DEQ 2, Design Standards for Wastewater Facilities. 1999.

DEQ. Circular WQB-7, Montana Numeric Water Quality Standards. January 2004.

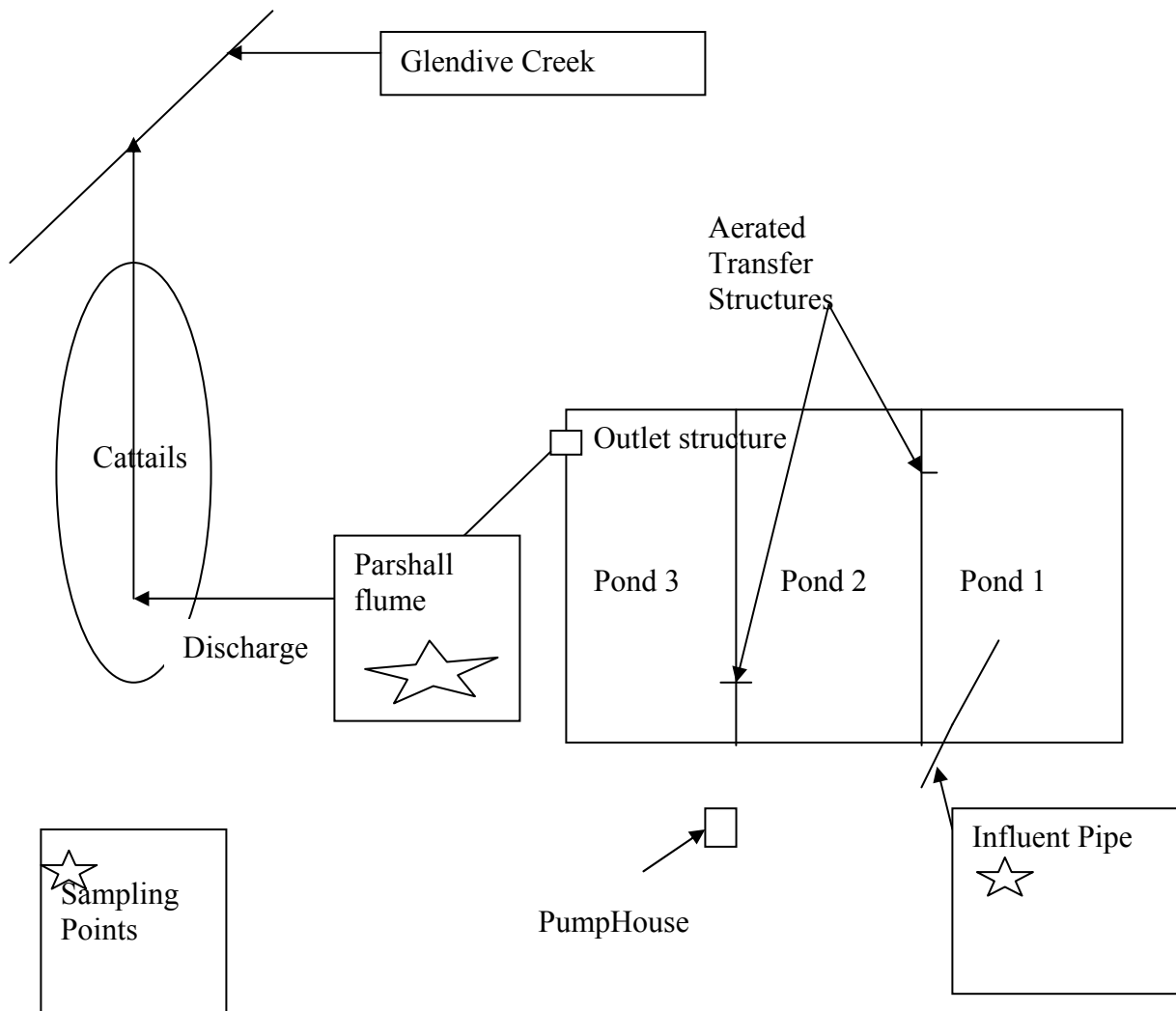
DEQ. Montana List of Water bodies in Need of Total Maximum Daily Load Development. 1996.

DEQ. Montana 303(d) List. A Compilation of Impaired and Threatened Water bodies in Need of Water Quality Restoration. Part A. Water Quality Assessment Results. 2006.

EPA. Office of Water, U.S. EPA NPDES Permit Writers' Manual, EPA-833-B-96-003. December 1996.

Prepared by: John Wadhams
Date: June 2007

Figure 1 – Sample Location



Parameter: Appendix I
Restriction:
Facility:
Permit Number:
Receiving Water:
Date:

Ammonia
January 1 - December 31
Glendive
MT0021628
Glendive Creek
April 5, 2007

Condition		%	Chronic	Acute	Other
Acute Std, mg/L				1.3	
Chronic Std, mg/L			0.28		
ACR					4.64
Mixing Zone					
7Q10	cfs		1.88		
Chronic MZ	cfs	25	0.47		
Acute MZ	cfs	0		0	
Effluent Flow	cfs		2.94	2.94	
Water Quality Std.	mg/L		0.28	1.30	
Background Conc.	mg/L		0.10	0.10	
Wasteload Allocation (from mass balance)					
WLA _c	mg/L		0.31		
WLA _a	mg/L			1.30	
Long-Term Average -Calc.					
Coeff. Variation (CV)	na				0.6
Percentile	%				95
LTAc, multiplier Table 5-1			0.64		
LTAa, multiplier Table 5-1				0.47	
LTAc	mg/L		0.20		
LTAa	mg/L			0.61	
LTA=min(LTAc, LTAa)	mg/L		0.20	0.20	
AML, multiplier Table 5-2			1.55		
MDL, multiplier Table 5-2				2.13	

		AML	MDL
Final Effluent Limit	mg/L	0.3	0.4

Comment: $CV=0.6$, $n=4$, $p=0.95$